Ohio Environmental Protection Agency

John R. Kasich, Governor
Mary Taylor, Lt Governor
Craig W. Butler, Director

March 17, 2017

Ms. Shari Kolak
Remedial Project Manager
U.S. EPA, Region 5
77 West Jackson Boulevard
Chicago, IL 60604

RE: Troy Well Field Unknown Source
Remediation Response
Correspondence
Remedial Response
Miami County
555001353004

Subject: Ohio EPA Review of Draft Focuses Feasibility Study Report for East Troy Contaminated Aquifer Site, Troy, Miami County, Ohio

Dear Ms. Kolak:

On January 13, 2017, the Ohio Environmental Protection Agency (Ohio EPA) Division of Environmental Response and Revitalization received the Draft Focused Feasibility Study (FFS) Report for East Troy Contaminated Aquifer (ETCA) site located in Troy, Miami County, Ohio. The FFS was submitted by SulTRAC. Ohio EPA is providing the enclosed comments to assist in the completion of an approvable document.

Ohio EPA requests a conference call with you and your management to discuss our General Comments prior to the finalization of the FFS. Satisfactory resolution of these comments are critical to our understanding and support of any interim remedy

Please contact me at (937) 285-6456 or Madelyn.Adams@epa.ohio.gov

Sincerely,

Madelyn Adams

Madelyn Adams
Site Coordinator
Division of Environmental Response and Revitalization

MA/tb

Enclosure

ec. Guy Montfort, TetraTech
Tim Fischer, USEPA
Erin LeGalley, DERR-CO
Allison Reed, DDAGW-SWDO
Chuck Mellon, DERR-SWDO
Tim Christman, DERR-CO
Jeff Martin, DERR-CO
Mike Starkey, DERR-SWDO
Mark Rickrich, DERR-CO

General Comments

1 In the following comments, Ohio EPA outlines numerous concerns regarding the selection of a ground water remedy without an initial pilot study. Due to unknowns regarding the geology of the aquifer, it is unclear if the most favorable remedy, In-Situ Chemical Oxidation (ISCO), will be effective. Therefore, Ohio EPA requests that a pilot study be conducted now during the FFS to determine specific aquifer parameters, such as hydraulic conductivity and natural oxidant demand (NOD), and to determine if ISCO will be effective in the target zones. As a part of the FFS, contingent remedies should be specified if the pilot study for the proposed remedy does not work as expected.

If U S EPA is unable to conduct a pilot study before a Record of Decision (ROD) is written, Ohio EPA requests that contingencies be written into the ROD to allow for alternate remedies if the pilot study indicates that the chosen remedy will not be effective

2 The cost share process for interim actions is unclear Please provide clarification on the following

a During the December 2016 conference call with Ohio EPA and U.S. EPA, U.S. EPA indicated that the remedial action cost share requirements apply to the interim actions Therefore, Ohio EPA is required to pay 10% of the remedy installation and 100% of operation and maintenance (O&M) It will be necessary to have a Superfund State Contract (SSC) or a Cooperative Agreement (CA) Please provide clarification on when this process will be initiated and the steps it will require

b The cost estimate for the interim ground water remedy specifies O&M activities starting in year one with the first injection of ISCO Does U.S EPA consider the ground water interim action to be a ground water restoration remedy with a 10-year long term response action (LTRA) period, or a source control maintenance/containment remedy without a 10-year LTRA period?

c. U.S EPA guidance states that the LTRA period starts and/or O&M is transferred to the state after the remedy is "operational and functional." For the proposed injection schedule at ETCA, when will the remedy be considered operational and functional?

d. U S EPA is proposing to install sub-slab depressurization systems (SSDS) at occupied structures over the ground water injection zones and possibly institutional controls A 30-year O&M schedule has been outlined in the cost estimate. Does the LTRA period apply to the SSDS and

institutional controls? When does U.S. EPA consider the SSDS and institutional controls to be operational and functional?

Pathway-Specific Comments – Ground Water

3. Uncertainties in aquifer geology: Section 1.2.2, page 14, discusses what is known about the site geology. Please evaluate how the depth of the contamination and the geology in the Residential Plume would impact the use and effectiveness of in-situ treatment, and other proposed remedies.

4 As a part of the FFS, hydraulic conductivity should be measured or more specific information should be provided for hydraulic conductivity Section 1 2 3, Site Hydrogeology, page 15, states that literature estimates for hydraulic conductivity of the aquifer vary (0.25-2 5 feet per day) and the Remedial Investigation (RI) provides a range of values It is Ohio EPA's position that hydraulic conductivity should be measured before a ROD is written.

It is important to understand the hydraulic conductivity and to directly measure it Specifically, hydraulic conductivity is a parameter that is used to calculate the ground water flow velocity. Ground water flow velocity will influence the predicted transport distance of the injected oxidant, which influences the amount of oxidant needed for successful distribution to the source material Because of the wide range in literature values, the use of an estimated hydraulic conductivity may over/under estimate the effectiveness of an in-situ remedy and the amount of oxidant needed. The remedy may not be able to achieve the 90% reduction Remedial Action Objective (RAO) and the cost estimate may be inaccurate

5. RAOs for the Residential Plume. Section 2.1.2, page 43, states that the RAO's are proposed to reduce dissolved phase mass However, Section 1 1 1 states that dense non-aqueous phase liquid (DNAPL) and sorbed tetrachloroethene (PCE) may be present and are acting as ongoing sources of contamination.

    a. Please provide additional information that supports the proposed in-situ remedies will also work to reduce the DNAPL and sorbed mass, as well as the dissolved phase contamination. For example, the highest PCE concentrations found just downgradient of the source area were at depths (~45 feet) that coincided with clay, clayey gravel and clayey sand ISCO has slow rates of diffusion into low permeability zones and tends to have preferential flow through more transmissive zones Considering this, Ohio EPA is concerned that the highest zones of contamination may not be addressed by ISCO.

    b. Before a remedy can be selected, it is necessary to have a sound basis for the remediation time frames and their ability to achieve the RAOs Sections 6.3.2.1, page 118, 6.3.2.5, page 121, 6.3.3.1, page 123, 6.3.3 5, page 125, 6 3 4.1, page 127, 6 3 4 5, page 130 and Appendices B and C

discuss the various injection technologies and state that they will be able to reduce the mass of contamination to 90% in 10-15 years. An explanation for how the proposed injection technologies will achieve a 90% reduction in mass has not been provided. Additionally, the FFS is missing an explanation for how the proposed injection technologies will achieve RAOs within 10-15 years. Please provide a rational for the 90% reduction and provide a basis (*i.e.*, modeling) for the remediation timeframes.

6. Appendix B, Residential Area Plume Dissolved-Phase Mass Calculations: From the tables provided, it is not clear how total mass and the percentage reductions were calculated. Therefore:

    a Please revise the first table with headers and gridlines because it is not clear what each number represents
    b Please describe the relationship between the two tables.
    c Please describe why the porosity value is different between the two tables and provide the reasoning for the chosen value.

7. Ground Water Institutional Controls:

    a Section 4.2.2 Institutional Controls, page 74, discusses that the potable use pathway for ground water is currently restricted by the city-wide ordinance. However, this may not be accurate. According to the text, the current city ordinance restricts the connection of a private water supply well to household systems. It appears that a ground water well could still be installed and/or utilized (though the City would not allow the well to be hooked up to their sanitary sewer) This would not preclude a property owner from having a potable supply well and not hooking it up to the sanitary sewer.

    b. Sections 4.2.2 Institutional Controls, page 74 and 5.2.2 and 5.2.3, pages 96 and 98, respectively, discuss expanding the City of Troy's ground water well ordinance to include non-potable ground water use restrictions. Please provide more details regarding the proposed use of the governmental controls for ground water use restrictions How would such a restriction be implemented and maintained?

8 Section 4.2.8, page 82, states that treated ground water be may discharged to injection wells, surface water, or to a publicly owned treatment works (POTW). All three of these discharge options will require some regulatory review: Underground Injection Control program (UIC) approval, a National Pollutant Discharge Elimination System (NPDES) permit, or pretreatment approval through the local POTW system.

9. For all injection technologies, please be aware that Ohio EPA's UIC program will have to approve the injection plan.

10. Performance monitoring-well system: Justification should be provided regarding the location of the performance monitoring wells located on Figure 5-3. No information regarding location or cost was provided in the text. Additionally, if an in-situ remedy is ultimately chosen, Ohio EPA requests that additional monitoring wells be installed to monitor the areas of highest concentrations and the plume boundaries to ensure that plume migration is not occurring. This is essential not only to monitor ground water but also for evaluating potential vapor intrusion impacts beyond the preemptive mitigation area.

    More specifically, additional monitoring wells should be installed in Zone A in the source area at varying depths to monitor the areas of highest concentrations during and after injections. Monitoring wells should also be installed along the plume boundaries in Zone A (and other zones) to ensure that concentrations above the maximum contaminant level (MCL) are not migrating into clean ground water. These additional locations could be proposed after remedy selection is finalized.

11 For all in-situ remedies, Appendix C states that ground water monitoring would continue until remediation goals are achieved. Ground water monitoring should not be discontinued at this time, because while ground water contamination may have been reduced, ground water MCLs will not have been reached. Ground water monitoring may need to be optimized, depending on the final remedy, but should not be discontinued.

12. Appendix C states that injection wells would be nested and screened at three different depths over the vertical interval. Please provide the proposed depths and a rationale for the depths.

13. Appendix C, Table C-2-3A indicates the same annual costs for oxidant injection during years 2 through 7. However, according to the table on page C-2-6, the amount of injection (numbers of zones) varies considerably during those years. Why does the annual cost stay the same whether 1 or 4 areas are being injected? Please revisit this estimation

Technology-Specific Comments – Air Sparging/SVE

14 Air sparging and soil vapor extraction (SVE) Section 4.2.5.5, page 80, provides an overview of air sparging/SVE for the interim ground water remedy. Air sparging/SVE is not retained for further consideration because of uncertainties in the lateral extent of clayey soils and logistical concerns with construction of an SVE system However, Ohio EPA recommends that air sparging/SVE be more thoroughly evaluated, including the use of horizontal wells. Considering the limitations of chemical injections, air sparging/SVE may be a more appropriate

remedy for an interim action, especially in the source area as it may be more successful in reducing the DNAPL and sorbed mass. Recently, Ohio EPA has seen success with this technology at the EPS site in downtown Dayton, Ohio. This technology has also been pilot tested at the Behr superfund site (also in downtown Dayton). Both sites have a similar geologic setting and are dealing with the same chemicals of concern (COCs) and spatial constraints in a populated, neighborhood setting. Additionally, the proposed interim ground water remedy, ISCO, has logistical and technical concerns that are similar to SVE/air sparging. Though the depth of contamination may limit this technology, Ohio EPA requests that the FFS include a more robust evaluation, discussion, and consideration of air sparging/SVE.

15. Ohio EPA requests that consideration be given to the use of ozone sparging as a remedial technology for the Residential Plume. Ozone sparging has been successful at another site in the southwest district with similar geology and COCs. Ozone sparging is similar to air sparging, though it does not require SVE as the ozone acts as an oxidant similar to ISCO oxidants and completely oxidizes chlorinated volatile organic compounds (VOC) in the aquifer. The same aquifer parameters are needed for the proposed in-situ technologies and the system would be set up similarly.

Technology-Specific Comments – ISCO

16. Considering sections 4.2.5.3, page 79, 5.2.4, page 99, and 6.3 3, page 123, please discuss the following concerns regarding the proposed ISCO remedy:

    a. Achieving effective contact between reagents and contaminants can be challenging, potentially leading to rebound. At sites in Ohio, and more specifically in the southwest district, rebound has commonly been seen with the use of ISCO. Additionally, immediately after injections, concentrations have significantly increased and remained elevated (perhaps because of mobilization or redistribution of contaminants). Please provide a brief discussion regarding how the proposed remedy and injection schedule will address any rebound that may occur.

    b Ohio EPA has seen displacement of dissolved phase COCs in transmissive zones by injected solutions, causing migration or redistribution of the plume. For ISCO, there are multiple injection events proposed over the course of 7 years. Please describe how the spreading of the plume will be controlled and monitored.

    c Injection depths are proposed to 100 feet west of Clay Street (Zones A and B) and 60 feet east of Clay Street (Zones C and D). Ground water monitoring should be conducted to the depths of the injections at the downgradient end of Zone B to ensure that contamination is not being moved deeper through Zones C and D

d. The DNAPL that is present will have high oxidant demands and could be potentially difficult to deplete. Additionally, there has been no direct quantification of the NOD of the sediments and how this may impact estimated and actual oxidant demand. Over or underestimating this number may impact the cost estimate if more or less oxidant is required. Please provide more information regarding how the amount of injectate was determined considering the contaminant distribution and lack of information regarding the NOD. Ohio EPA requests that this information is gathered during the FFS to better estimate costs.

e. The text mentions mobilization of heavy metals, such as chromium. This is a concern, especially in relation to the city of Troy's source water protection area and the ISCO treatment schedule. The text states that the chromium that may be mobilized should re-precipitate after exiting the treatment zone The potential for this to occur should be investigated as a part of any treatability study.

f Specifics should be provided as to how the precipitation of manganese (di)oxide will be prevented/reduced, especially in Zone A as precipitation could restrict treatment of the DNAPL

g. Ohio EPA recommends that U.S EPA consider the long-term effects of ISCO injections and the impact that ISCO injections will have on the aquifer chemistry and the microbes currently present. The aquifer may not be amenable to monitored natural attenuation (MNA) after ISCO is completed This could impact the implementation of MNA as a long-term remedy, which has been discussed in previous documents. Please provide information or studies that support the implementation of MNA after ISCO Alternatively, provide a brief discussion of other contingent/long-term remedies that may be implemented after ISCO

Technology-Specific Comments - ERD/ISCR

17. Additional support is necessary for the implementation of enhanced reductive dechlorination (ERD) and in-situ chemical reduction (ISCR) as information collected during the RI does not indicate that the aquifer would be amenable to reducing conditions Consider the following: The RI Report and the draft FS concluded that there was little evidence that natural attenuation is occurring at a detectible rate at the site Additionally, the aquifer currently shows little to no degradation of contaminants and biodegradation would likely need some enhancements

The degradation product, *cis*-1,2-dichloroethene (cDCE), has been detected in ground water at very low levels in the Residential Plume, and vinyl chloride (VC) has not been detected

The first few Waterloo boring logs all indicated that the aquifer was aerobic and possessed inadequate conditions for biodegradation.

The RI examined MNA parameters and concluded that for the majority of parameters, there is limited, if any, degradation occurring, and the parameters do not support active dechlorination. The parameters present (nitrate, sulfate) may compete with the reductive pathway.

Additionally, the dissolved oxygen (DO) concentrations supported the aerobic state of the aquifer. The RI stated there is no evidence of active biodegradation/reductive dechlorination occurring in the Residential Plume area.

18 Recirculating of ground water for reduction technologies: Additional information should be provided about the recirculation and extraction proposed with the in-situ remedies to evaluate whether this would be effective considering the extent of the plume and the proximity to the wellfield's source water protection area. Sections 5.2.2, page 95, and 5.3.2, page 98 discuss that water from the downgradient end of Zones B, C and D would be used to recirculate through those Zones. Additional information should be provided that would support protection of receptors in these zones. The production of daughter products should also be considered.

19. Section 5.2.2, page 95, discusses the use of bioaugmentation with proprietary Dehalococcoides (DHC) microorganism cultures Please clarify if the DHC bioaugmentation will be applied for both RGW-2 and RGW-3. While the text does not specifically mention it for RGW-3, the cost tables include it.

20. Ohio EPA recommends that if a remedy with pumping or recirculation is chosen, scenarios be modeled to ensure protection of the wellfield's quality and quantity.

21. Section 5.2.3.1, page 98, states that the remedial design for Alternative RGW-3 would have to consider factors such as proximity to the city of Troy's wellfield. To ensure protection of the wellfield, this should be considered for all possible alternatives.

22. Section 6.3.2.1, page 118 discusses possible generation of chlorinated daughter products and states that corrective measures could be implemented if daughter products are generated. Please provide examples of corrective measures and what may be done if daughter products are generated

23 Section 6 3.2 6, page 121, does not state if the technical feasibility of ERD would be difficult, as it does in Section 6.3.3 6 for ISCR It seems that the level of difficultly would be the same, as the technical concerns are almost identical. Please provide further information on the technical feasibility of ERD

Pathway-Specific Comments – Vapor Intrusion

24. Ohio EPA is concerned about the extent of the proposed preemptive vapor intrusion mitigation area. The extent of potential vapor intrusion impacts was not delineated in the RI. This issue is also discussed in Comment 46(b) of Ohio EPA's August 21, 2015 comment letter on the FS. In particular, Ohio EPA is concerned about the buildings north of Main Street, across from the suspected source area beneath the First Presbyterian Church. These buildings are within 100 feet of the highest VOC concentrations in ground water that will undergo treatment. In addition, Ohio EPA is concerned about the extent of the preemptive mitigation area in the downgradient direction. For example, the 100 µg/L VOC plume line (although not a vapor intrusion action level, this line provides a useful point of reference) extends to Frank Street, a block beyond the end of the mitigation area along Counts Street Ohio EPA requests that the preemptive area be extended to include these additional structures.

25. It is critical that the preemptive mitigation area be appropriately identified, as ground water treatment may temporarily worsen the vapor intrusion pathway. To aid in understanding the potentially affected structures, Ohio EPA requests that figures be generated for individual VOC depicting ground water plume contours to the vapor intrusion screening level (VISL).

26. The proposed ground water treatment technologies may worsen ground water concentrations, generate daughter products, and move the ground water plume Increased concentrations, daughter products, and migrating plumes may expand beyond the vapor intrusion preemptive mitigation area Please provide a discussion on the possible effects that ground water treatment may have on the area of vapor intrusion concern and additional measures that may be taken to further mitigate vapor intrusion

27 Vapor Intrusion Institutional Controls. Section 5 3.2 Soil Vapor Alternative VI-2, page 102, discusses using institutional controls to restrict land use or require vapor mitigation systems in the form of restrictive covenants, zoning prohibitions, and advisories Please provide information on how these institutional controls would be implemented and monitored and the criteria that would be used to determine the use of an institutional control on vacant land. Additionally, the text states that these institutional controls "*may be*" implemented – please clarify whether or not institutional controls are being proposed as a component of the vapor intrusion pathway interim remedy.

28. Section 2 3 3, page 55, discusses that vapor mitigation is proposed at all occupied structures above the ground water treatment areas and in a downgradient buffer zone However, the text cites this work as necessary due to a lack of access from previous sampling attempts If U S EPA has been denied access for sampling in the past, it is likely they will be denied access for the installation of mitigation systems. Therefore, it is not clear how the vapor

intrusion RAO will be addressed. Similarly, Section 5.2.2.1, page 97, states that structures over the ground water injection zones will be offered an SSDS and that this will ensure that the generation of dechlorination byproducts will not result in vapor intrusion concerns. More information and contingencies are needed for how receptors will be protected if access to install an SSDS is not granted

29. Section 4.3.5.1, page 88, states that, *"For the ETCA site, the ground water plumes underlie numerous privately owned properties. Therefore, effective SVE systems would be difficult to implement"* This is used as the basis for not retaining SVE as an option for containment of soil vapor to mitigate soil vapor intrusion. It is not clear why a system could not be installed in right of ways near structures where access for indoor air sampling or mitigation systems are denied. Given the implication in Section 2 3.2 that U.S EPA will likely be denied access to install mitigation systems in a number of structures, Ohio EPA believes this alternative should be retained for consideration.

30. Section 5.3 2.3, page 103, states that older structures may have dirt basement floors requiring installation of a plastic membrane to ensure that an SSDS can function. It is unclear how many homes are estimated to have dirt floor basements (for example, based on previous sampling efforts) or how these situations might affect the cost estimates for the vapor intrusion remedy. Please provide further discussion on the likelihood of encountering dirt floor basements and how that will affect the cost estimate.

Pathway-Specific Comments – Soil Remediation

31 According to the RI and the FFS (Section 5.1 2.2, page 92) contamination may be located below the Hobart and Spinnaker buildings. Please provide a discussion of whether or not this contamination may pose a threat to ground water cleanup and potential vapor intrusion threats Is there a plan to revisit these areas during the FS?

32. In Appendix C, the cost estimate for soils Alternative S-2 gives the same volumes of excavated soil and backfill. Normally, compaction during backfilling will increase the amount of backfill, requiring a larger volume than what was excavated. Please consider revisiting this estimation.

Appendix C – General Comment

33. Appendix C cost estimates for the alternatives provide a 30% "contingency" The cost estimates at the detailed analysis stage should provide an accuracy of +50% to -30%. It is unclear what is meant by the 30% contingency Please provide a rational for its use